Office of Space Science

Discovery Program Plan

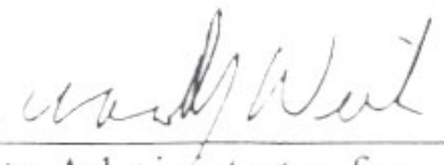
APPROVED BY:

David B. Jarrett
Discovery Program Manager

7/20/99
Date


Director, NASA Management Office

7/21/99
Date


Associate Administrator for
Space Science

10-12-99
Date

Table of Contents

1.0 Introduction and Program Overview

1.1. Introduction

The Discovery Program is intended to provide opportunities for the space science community to propose innovative and streamlined planetary science missions complementary to those missions planned by Space Science Enterprise Strategic Plan roadmaps but not specifically addressed therein. The Discovery Program is composed of a long-term series of space science missions that are independent, but share a common funding and management structure. It is expected that the Discovery Program will continue indefinitely.

1.2. Overview

This document provides the Discovery Program:

a. objectives and performance goals;
b. program-level requirements;
c. management organizations responsible for the program;
d. resources, schedules, and controls;
e. other key aspects of the Discovery Program that involve tailoring of National Aeronautics and Space Administration (NASA) Procedures and Guidelines (NPG) 7120.5 processes or requirements, unique relationships with other programs, and program-wide requirements on Discovery Projects.

2.0. Program Objectives and Performance Goals

2.1. Program Objectives

The Discovery Program is designed to accomplish frequent, high quality planetary science investigations, using innovative and efficient management approaches. The program's prime objective is to enhance our understanding of the solar system as it is today and of solar system formation and history. In the process, it also seeks to substantially reduce total mission cost and development time and improve performance through the use of new technology and through commitment to, and control of, design, development and operations costs. Finally, it seeks to enhance public awareness of, and appreciation for, space exploration and to incorporate educational and public outreach activities as integral parts of space science investigations.

Discovery missions are solar system science missions intended for exploration of solar system bodies, either by travelling to them or by remote examination. Both our own solar system and the extrasolar planetary systems are included in this definition.

The Discovery Program is an outgrowth of a Space Science Enterprise effort to develop a science program of frequent, small planetary missions that will perform high-quality scientific investigations while emphasizing those that can be accomplished under the control of the scientific research community. It seeks to reduce total mission life cycle costs and to improve performance through the use of new technology, through strict

control of costs, and through more efficient management by assigning increased responsibility to the Principal Investigators (PI's).

The scientific goals of planetary science within the Office of Space Science (OSS) are generally contained in *The Space Science Enterprise Strategic Plan*, dated November 1997. The term "planetary science" encompasses the scientific objectives of:

- The NASA Solar System Exploration theme, and
- The search for extrasolar planetary systems within the NASA Astronomical Search for Origins theme.

2.2 Performance Goals

Discovery Mission Investigations are complete missions launched on Expendable Launch Vehicles (ELVs) or the Space Shuttle. The total cost to NASA for all phases of a Discovery investigation (including the definition, development, launch service, and mission operations and data analysis costs) is not to exceed $299 million (Fiscal Year 99 dollars). NASA funding for the Phase A concept study will be limited to $375K (real year dollars) for each study effort.

Within this cost cap, mission development costs (costs incurred from the start of Implementation to launch plus 30 days) will be limited to $190 M (FY 99 dollars). Formulation (Phase A/B), mission operations and data analysis (Phase E) and all launch service costs (ELV or Shuttle) must be included in the total mission cost to NASA.

Prior to the release of future Discovery Announcements of Opportunity (AOs), this cost cap will be evaluated by OSS to determine if an adjustment is required to maintain the quality of science desired under the Discovery Program.

The Discovery Program is intended to provide a mechanism to accomplish important scientific investigations within a short timeframe; therefore, the schedule for all Discovery missions must be such that launch occurs within 35 months from the start of Project Implementation (Phase C/D). No constraint is placed on the length of Project Formulation or mission operations and data analysis phases.

Discovery Missions of Opportunity (MO) are investigations characterized by being part of a non-NASA space mission of any size, and having a total cost to NASA under $22 million (in FY 99 dollars). NASA funding for the concept study will be limited to $250 K (real year dollars). The PI assumes all risk for delays in the mission. These missions are conducted on a no-exchange-of-funds basis with the organization sponsoring the mission. NASA intends to solicit proposals for MO's with each Discovery AO issued.

3.0 Customer Definition and Advocacy

3.1 Customer Definition

The Discovery Program customer base is centered in the space science community (especially within the planetary science community) representing the space science themes for Solar System Exploration and the Astronomical Search for Origins (specifically the search for extrasolar planetary systems).

3.2 Customer Advocacy

Discovery Program customer advocacy is achieved through interactions between OSS and the science community. These interactions involve the NASA OSS scientific advisory committees as well as day to day contacts by the Discovery Program Scientist(s) and Discipline Scientists resident in the OSS Research Program Management Division. Each Discovery Mission will have a Principal Investigator and may also have a Project Scientist at the implementing organization who will provide similar science community interfaces for that specific project.

Contact between the Discovery Program Manager resident in the NASA Management Office (NMO) at the Jet Propulsion Laboratory (JPL) and the science community is through the selected PI's, the Discovery Program Scientist(s) and Discipline Scientists, Advisory Committees, AO pre-proposal conferences, scientific meetings, and periodic workshops to solicit feedback on program processes and program effectiveness.

4.0 Discovery Program Authority and Management Structure

This section describes the authority and responsibilities of Discovery Program participants pertaining to all phases of the program, from development of the program budget guidelines and the development of the AOs through completion of the investigations, including delivery of the science data and publication of the preliminary science results.

4.1 Authority

Program authority is delegated from the Associate Administrator (AA) for Space Science through the Director of the NMO located in Pasadena CA, to the Discovery Program Manager. The PI for each Discovery Project is responsible for the overall success of the project and is accountable to the AA for Space Science for scientific success and to the Discovery Program Manager for programmatic success. The NASA Program Management Council (PMC) is the governing PMC for the Discovery Program. Typically, the Governing Program Management Council (GPMC) for each Discovery Project will be established at an organizational level below the NASA PMC. For NASA and JPL missions, this will be the respective Center's GPMC. For non-NASA missions, NMO may establish a standing review board, including independent personnel from the implementing organization, to provide this function in lieu of a NASA Center GPMC.

4.2 Responsibilities

For the Discovery Program, there are three principal levels of responsibility: scientific and strategic management within OSS, which draws support from the Langley Research Center (LaRC); Discovery Program management at NMO which draws support from JPL; and implementation and conduct of Discovery investigations by the Discovery Project teams. Each level is controlled by a specific document. These documents are the Discovery Program Commitment Agreement (PCA), the Discovery Program Plan, and a mission-specific Project Plan (or equivalent) for each approved investigation. The mission-specific Concept Study Report (CSR) may serve as the mission-specific project plan. Each approved mission will also have program level requirements documented in an appendix to the Discovery Program Plan. A Mission Definition and Requirements Agreement (MDRA), drafted during the investigation proposal period and finalized during the Project Formulation phase, is a principal input for both the mission-specific Program Level Requirements Appendix and the mission-specific project plan (or equivalent). The organizational relationship prior to project selection is presented in Figure 1. The organizational relationship for project formulation and implementation is presented in Figure 2. The roles and responsibilities of organizations within each of these levels are described in the following paragraphs.

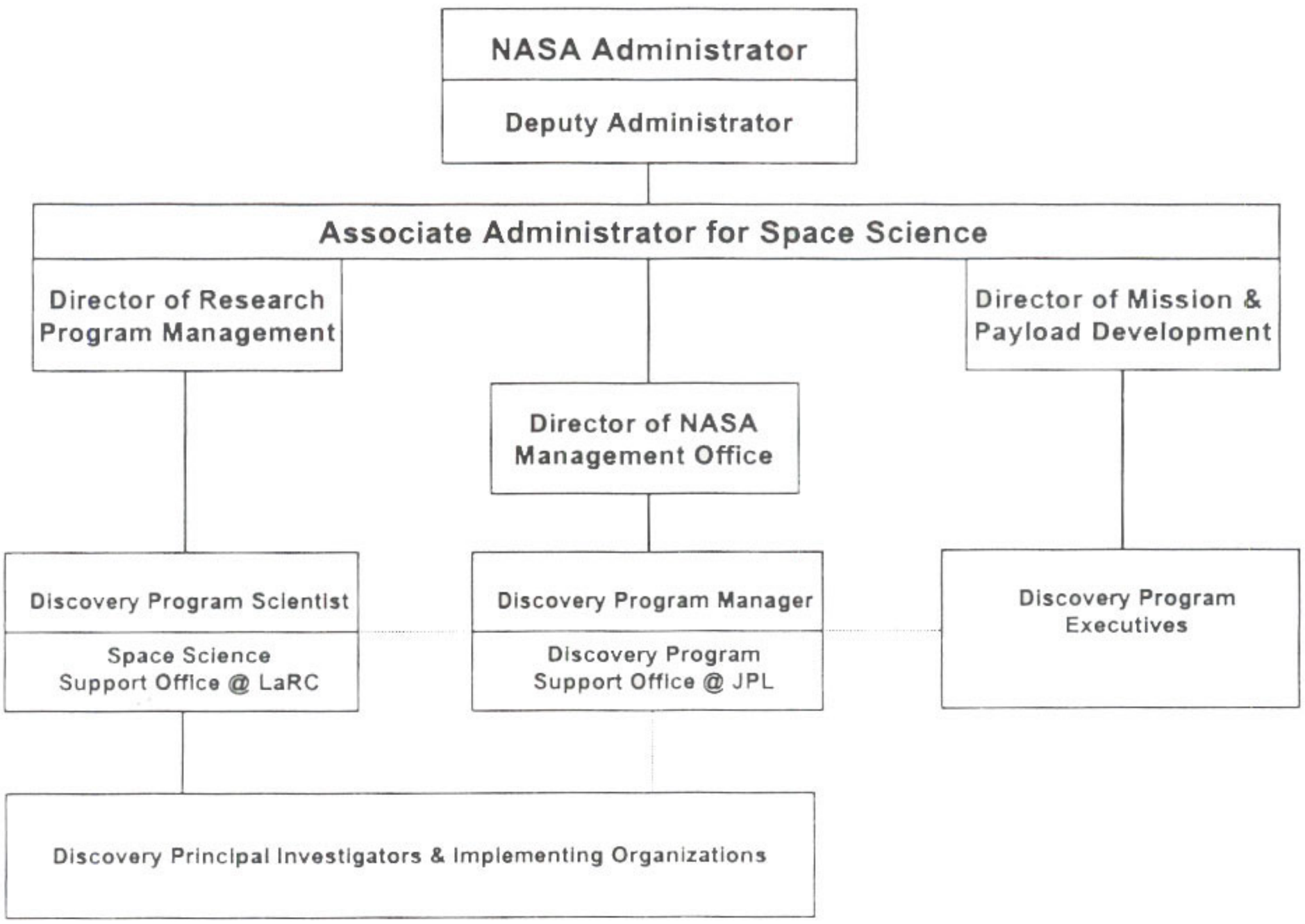


Figure 1. NASA Organization for the Discovery Program Prior to Project Selection.

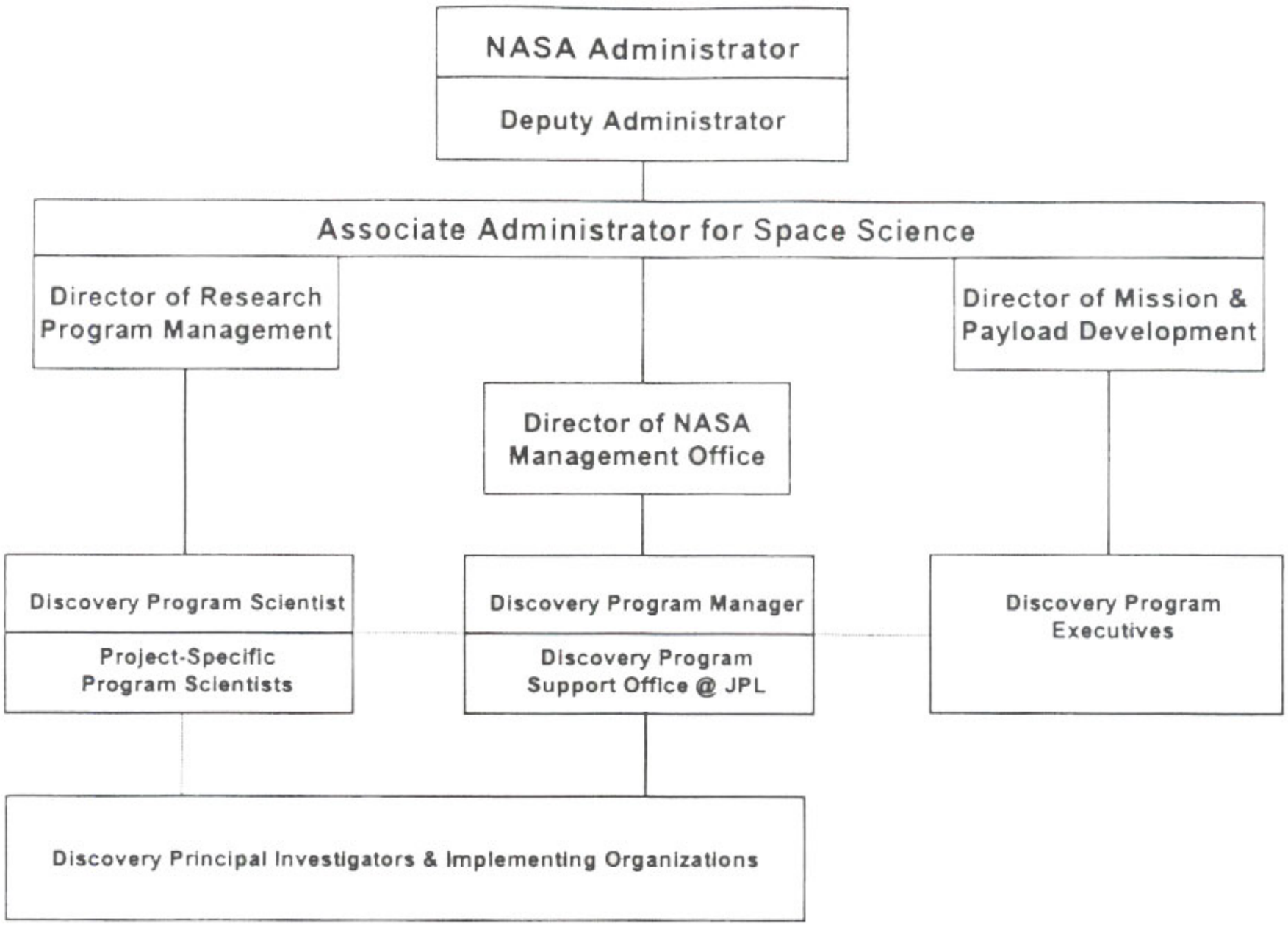


Figure 2. NASA Organization for the Discovery Program for Project Formulation and Implementation.

4.2.1 NASA Headquarters

In accordance with the NASA Strategic Management Handbook (October 1996), NASA Headquarters OSS has the responsibility for scientific and strategic direction for the overall Discovery Program. For the Discovery Program, the AA for Space Science has delegated the following programmatic responsibilities to the Mission and Payload Development Division (Code SD) and scientific responsibilities to the Research Program Management Division (Code SR) at NASA Headquarters:

- Develop Program Operating Plan (POP) budget guidelines; review and approve Discovery Program budgets;
- Coordinate launch vehicle and communication budgets with the Office of Space Flight (OSF) Program Office:
- Delegate 506 funding authority to the Discovery Program Office;
- Develop and maintain the Discovery Program Commitment Agreement (PCA);
- Approve the Discovery Program Plan;
- Approve mission-specific Program Level Requirements Appendices and any subsequent changes;
- Assign Mission Implementing Organization responsibilities consistent with selected mission teams;
- Approve Discovery MDRA's;
- Approve Mission Success Criteria and Launch Contingency Plans;
- Approve changes to key project science personnel from original proposal;

- Provide program advocacy, both internal and external to NASA;
- Ensure effective Program communications across all program elements;
- Develop and maintain Enterprise strategies and science plans ensuring effective coupling with the Discovery Program;
- Manage the science selection process including definition and timing of the AOs; issuance of AOs; review of proposal evaluations; selection of Discovery investigations; and review and approval of downselections and the execution of contract options;
- Provide interfaces to external organizations in all Discovery matters, particularly in developing International and inter-Agency Agreements in coordination with the Office of External Relations;
- Manage the launch approval and environmental impact processes as necessary to support selected missions;
- Assess program and individual mission performance against program level requirements, including cost and schedule constraints;
- Conduct Mission Confirmation Reviews.

4.2.2. Discovery Program Office

The AA for Space Science has assigned the NMO to be the Lead Center for the Discovery Program. The NMO Director, who appoints the Discovery Program Manager, is responsible for overall Program success and is accountable to the AA for Space Science. The Discovery Program Manager is accountable for directing a program which meets NASA, OSS, and Discovery Program requirements within established cost, schedule, and performance boundaries.

The Discovery Program Office has program management responsibility of Discovery Project development, launch, on-orbit checkout, mission operations, and data analysis The Discovery Program Office is responsible to ensure that each Discovery Project remains within its committed cost, schedule, performance, reliability, and safety requirements and meets its commitments for Education and Outreach, Technology Transfer, and Small Disadvantaged Business and Minority Institutions. The Discovery Program Office promotes efficiencies through the application of innovative management practices, the identification and implementation of inter-mission synergies, and the capture and application of lessons learned. The Discovery Program Office will perform the following specific responsibilities:

- Develop the Discovery Program Plan that documents the Discovery Program framework under which Implementing Organizations and Mission Teams can operate;
- Approve project plans and concur with the baselining of and changes to mission-specific Program Level Requirements Appendices, when appropriate;
- Approve changes to key project personnel from original proposal;
- Integrate and manage Discovery Program budgets; ensure appropriate distribution of funds to Implementing Organizations by OSS;
- Support OSS with Discovery Program advocacy;
- Ensure open communication with Discovery Program customers and communicate program customer needs to OSS;

- Support the Agency review of lessons learned, and ensure that they are incorporated appropriately;
- Support OSS in the initiation and preparation of Discovery AOs;
- Conduct technical and resource management of all contracts, grants, and task orders;
  - Be fully responsible for Task Orders to JPL as an Implementing Organization.
  - Support the Goddard Space Flight Center (GSFC) in their role to develop, negotiate and issue contracts for Discovery missions consistent with the approved proposals;
  - Support GSFC in its role of providing contract financial administration and execution of contract options for non-NASA and non-JPL Discovery Projects when approved by OSS;
- Coordinate the provision of government-furnished services and hardware, including space communication support and launch vehicle services, for all Discovery missions;
- Conduct continuing assessments of the programmatic progress of projects including management and cost; and assure appropriate independent review of projects;
- Support monthly and quarterly project reviews with OSS and report overall program status and assessments quarterly;
- Review weekly integrated mission reports submitted by the Discovery Program Support Office;
- Make recommendations for continuation or termination of a mission to NMO and OSS;
- Participate in mission-specific reviews including Mission Design Reviews, Confirmation Readiness Reviews, and Confirmation Reviews; present Discovery Program Office assessments to OSS;
- Serve as an ad hoc member of GPMCs or Senior Management Review Boards for Discovery mission reviews (e.g., Confirmation Readiness Reviews, Launch Readiness Reviews, etc.).

4.2.3. Discovery Program Support Office

The Discovery Program Support Office, which provides technical support to the Discovery Program Office, is managed within the Office of the JPL Deputy Director and is staffed by JPL specialists. The Discovery Program Support Office is entirely isolated from any and all directly competitive and financial aspects of the Discovery Program. The office will perform the following responsibilities:

- Support the development of the Discovery Program Plan, mission requirements and project plans;
- Prepare NASA agreements with external organizations for Discovery Program Office and OSS approval;
- Advise potential and selected PIs;
- Support the Agency review of programmatic lessons learned, and ensure that they are incorporated appropriately;
- Support the Discovery Program Office and OSS with program advocacy;
- Conduct continuing assessments of the progress of missions including areas of science, technical, product assurance, and management;
- Provide mission assessments and directed studies as assigned;
- Review weekly mission reports;

- Prepare weekly integrated mission reports for the Discovery Program Manager;
- Conduct Discovery mission independent assessments, and present results to the Discovery Program Office and OSS;
- Conduct Confirmation Assessments, as requested.
- Coordinate an education and outreach program with each project, the Discovery Program Office and OSS to ensure that the education and outreach activities of each project are consistent with the OSS education and outreach strategy and that duplication of effort is avoided.

4.2.4. Discovery Principal Investigator and Implementing Organizations

Overall responsibility for scientific integrity, safety, and mission success is vested with the PI of each specific Discovery mission. This individual is the lead scientist and will organize the team or consortium that will develop the mission concept, propose it, and, if selected, implement the mission under the prescribed guidelines and constraints. The consortium may include members from one or more of the following: industry, Federally Funded Research and Development Centers (FFRDCs), universities, governmental organizations (such as a NASA Center), and/or foreign institutions. The management approach is chosen by the PI, as best suits the mission design, skills/expertise of the team members and resources. The PI-led team will have a large degree of freedom to accomplish its proposed objectives within the stated constraints with minimal NASA oversight. However, NASA will hold the PI accountable for proper execution of all aspects of the mission. It is incumbent upon the PI in any management arrangement to notify the Discovery Program Manager if the successful achievement of the minimum scientific objectives is not achievable within the prescribed programmatic constraints.

The Discovery Program Office will establish interfaces with each Discovery Project, typically through the PI or his designee (e.g., the Project Manager) at an Implementing Organization. This organization may be either a government organization or another type of institution, depending on the particular mission. The Discovery Program Office will work directly with the PI and this institution in accomplishing the mission, particularly in the areas of resource allocation and utilization, oversight and reporting. The PI has final authority for requirements, cost, and schedule that affect the scientific integrity of the mission. Each PI-led team and Implementing Organization will:

- Develop the mission-specific Program Level Requirements Appendix and the mission-specific project plan (or equivalent);
- Develop the MDRA;
- Support OSS and the Discovery Program Office with program advocacy;
- Develop and conduct the mission in accordance with the project plan (or equivalent) including acceptance of responsibility for mission performance;
- Manage the mission budget;
- Establish and conduct a confirmation readiness process culminating in a Confirmation Review with the AA for Space Science to affect the transition from formulation to implementation (i.e., Phase A/B to Phase C/D);
- Certify the flight readiness of each Discovery mission, by letter through the Discovery Program Office, to the AA for Space Science. For NASA Field Centers and JPL, the

readiness review will be accomplished by the respective Center's GPMC with the Discovery Program Manager as an ad hoc member of that board. For non-NASA missions, NMO may establish a standing review board, including independent personnel from the implementing organization, to provide this function in lieu of a NASA Center GPMC;

- Support independent assessments and confirmation reviews;
- Report progress and status monthly and quarterly, and more frequently if requested by the Discovery Program Manager; report status weekly after the Project's Critical Design Review (CDR);
- Develop and implement an education and outreach activity consistent with the Office of Space Science education and outreach strategy.

4.2.5. Space Science Support Office (SSSO)

The SSSO located at LaRC will perform the following functions:

- Assist OSS with preparation and issuance of AOs;
- Support the review of proposals by conducting reviews of technical, management, cost, and other programmatic factors ;
- Support the review of concept studies by conducting reviews of technical, management, cost, and other programmatic factors for the downselection process;
- Conduct independent assessments of ongoing missions, when requested.

4.3 Program Reporting Requirements

The Discovery Program Office is required to report to senior NASA management in the following forums:

Forum	Report	Schedule
Quarterly Program Reviews	Technical Progress, Cost, Schedule	Quarterly
NASA PMC Quarterly Program Status Reviews*	Technical Progress, Cost, Schedule	Quarterly

* Typically presented by a representative from the Office of Space Science.

4.4 Program Flexibility

It is recognized that the Discovery Program structure and processes will change over time in response to the needs of OSS and the science community. The Discovery Program Office will work with OSS to define and implement appropriate changes to the program as applicable. These changes will be formalized by changes to this document.

5.0 Program Requirements

5.1 Launch Rate

The Discovery Program shall have a launch rate that will allow a mission launch every 12 to 24 months within the Discovery Program funding profile. The launch of Missions of Opportunity may substitute for regular Discovery missions in this accounting, if appropriate, based on when they were selected, funding profiles, and expected launch dates.

5.2 System Safety and Mission Assurance

All Discovery Projects managed by NASA Field Centers or JPL shall be developed and operated within the framework of the NASA and/or JPL International Standards Organization (ISO) 9000 quality management systems, respectively. Non-NASA projects shall be developed using their implementing organization's internal quality management system. The mission assurance requirements will be tailored to each project as identified in the proposal submitted in response to the AO. Each project shall implement a system safety program that meets the requirements of the launch vehicle provider at the launch site hardware processing facilities.

5.3 Education and Outreach

A substantive education/outreach program shall be an integral element of every Discovery Project and the PI shall devote adequate resources to the planning and implementation of such an effort. In accord with the policies outlined in *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (October 1996), a guideline of 1 to 2% of the total project budget shall be allocated to education and outreach. The approach for each project's education and outreach program should be consistent and coordinated with the outreach program for the relevant OSS science theme. Projects shall document in the proposal and Confirmation Review data package the PI's approach for planning and implementing an education/outreach program. Costs for such activities must be phased as a part of mission planning, development, and operations costs.

5.4 Technology

NASA seeks to infuse new technologies into its programs and to strengthen the mechanisms by which it transfers such technologies to the private sector, including the non-aerospace sector. The means by which OSS plans to implement new technology is described in the *Office of Space Science Integrated Technology Strategy* (April 1994). However, investigations dependent on new technology must have adequate backup plans defined for use in the event that the new technology encounters problems and will not be ready prior to assembly and test of the spacecraft.

5.5 Small Disadvantaged Business and Minority Institutions

Discovery Projects shall agree to use their best efforts to assist NASA in achieving its goal for the participation of small disadvantaged businesses, women-owned small

businesses, Historically Black Colleges and Universities, and other Minority Educational Institutions in NASA procurements. Investment in these organizations reflects NASA's commitment to increase the participation of minority concerns in the aerospace community, and it is to be viewed as an investment in the nation's future. Contracts resulting from Discovery AOs will be required to contain a subcontracting plan that includes goals for subcontracting with small, small disadvantaged and women-owned small business concerns.

5.6 Environmental

All Discovery Projects shall conform to NASA and U.S. environmental requirements for mishaps, orbital debris, radiation sources and other environmental concerns. Radioisotope Thermoelectric Generators (RTG) are not permitted on Discovery missions. Other, smaller radioactive devices, such as heating units or instrument calibration sources, are permitted, but such usage will require, as a minimum, an environmental assessment.

5.7 Success Criteria

The success criteria for each mission are developed prelaunch by the Discovery Program Office in coordination with the PI. These criteria are concurred on by the Program Executive, Program Scientist, and Director of Mission & Payload Development Division and are approved by the AA for Space Science or the designated OSS Science Director(s).

5.8 Program Level Requirements for Discovery Projects

The mission-specific program level requirements for each Discovery Project are set forth in a Program Level Requirements Appendix to this document, approved by the Principal Investigator, the Program Manager, the NMO Director, the Mission and Payload Development Division Director, and the AA for Space Science or his designated Science Director(s). Additional approvals may be required (e.g., Program Scientist, Program Executive, etc.), depending on the specific project. These requirements are controlled by the AA for Space Science and can only be changed through an approved change request to OSS.

Mission-specific program level requirements shall define both the baseline and the minimum science requirements based on the selected proposal and according to the following definitions:

Baseline Mission (Science) Requirements – Those requirements that, if fully implemented, will accomplish the entire set of scientific objectives identified at the initiation of the mission.

Performance Floor (Minimum Science Requirements) – This is the minimum science component below which the mission will not be considered justifiable for the proposed cost.

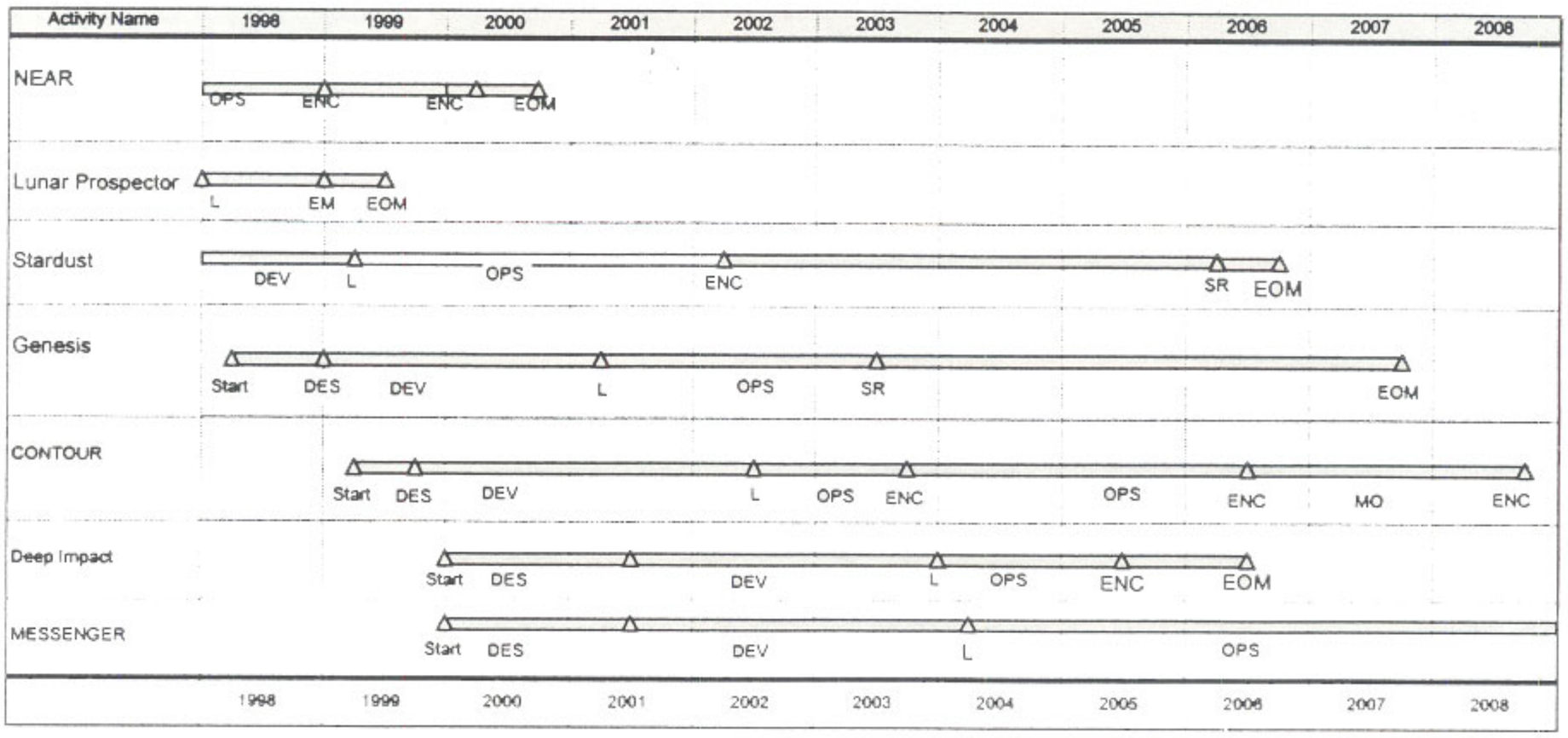
The PI will have the flexibility to descope the project science requirements from the baseline to the minimum science requirements in incremental fashion as delineated in the approved proposal. NASA Headquarters and the Discovery Program Office shall have concurrence as these options are exercised.

All Discovery Projects are cost capped. The cost cap shall apply to the full life cycle cost for formulation, implementation, launch, operations, data analysis and archiving. The maximum allowable cost cap for each Discovery mission class is defined in the AO; however a mission-specific cost cap shall be established for each project through the proposal and formulation process. The PI commits to the project cost cap specified in the Mission Concept Study Report, a report detailing the technical and managerial aspects of the project following the concept study phase of the project prior to the downselection by the AA for Space Science.

6.0 Program Schedule

The current Discovery Program Master Schedule is shown in Figure 3. This schedule will be updated based on specific changes to the mission-specific Program Level Requirements Appendices and Program Operating Plan agreements between the Discovery Program Office and OSS.

Discovery Program Master Schedule



DES: Design
DEV: Development
EM: Extended Mission
ENC: Encounter
EOM: End of Mission
L: Launch
OPS: Operations
SR: Sample Return

Schedule Mstr 7/99

7.0 Controls

7.1 Program Level

Changes to this Discovery Program Plan or to a mission-specific Program Level Requirements Appendix must be approved by the signatories for these documents. The Discovery Program Office will administer configuration management of these documents. Because of the relatively low cost and short development schedules of Discovery Projects, the AO selection process and the subsequent Confirmation Review for individual projects substitutes for the Non-Advocate Review (NAR) and no Independent Annual Review (IAR) will be held for Discovery Projects. IAR's will be conducted for the overall Discovery Program. AO review and PI/Mission selection are the responsibility of OSS and are carried out to meet the requirements of the NASA Federal Acquisition Regulations (FAR) Supplement.

The OSS Program Executive in the Mission and Payload Development Division is responsible for maintenance of the Discovery PCA as the agent for the AA for Space Science. Any candidate changes to the PCA must be approved by the AA for Space Science and then presented to the NASA PMC for its concurrence prior to submission to the NASA Administrator for signature.

7.2 Project Level

The key program level requirements on each project are the science requirements, launch timeframe, and cost cap, as documented in the mission-specific Program Level Requirements Appendix to this Program Plan. The Discovery Program Office regularly reviews each project's status and projected ability to meet its requirements. If at any time the project appears unlikely to meet its program level requirements, it is subject to a special review and possible cancellation by the AA for Space Science.

Each project shall develop a project plan or equivalent. The Mission Concept Study Report may serve as the mission-specific project plan.

There is no Allowance and Programmatic Adjustment (APA) held for Discovery Projects by OSS or the Discovery Program Office. All reserves for Discovery Projects are controlled at the project level, within the cost cap.

Each Discovery Project is verified for compliance with Discovery Program requirements by independent review during the AO selection process and by a Confirmation Review prior to proceeding into implementation. The review of the concept studies is part of the AO selection process and, therefore, is the responsibility of the LaRC SSSO.

A Confirmation Review process shall be conducted for each project to assess its readiness to proceed from formulation to implementation (i.e., from Phase B to Phase C/D). This process involves a set of steps leading to a Confirmation Review with the AA for Space Science, who is the approving official to affect this transition.

The Project team will plan normal design and programmatic reviews to allow the GPMC to judge project readiness to proceed to implementation. This will typically involve a technical design readiness aspect (e.g., a Preliminary Design Review - PDR), and a programmatic readiness aspect (e.g., a Confirmation Readiness Review - CRR) presented to a GPMC for NASA and JPL developed missions. For non-NASA missions, NMO may establish a standing review board, including independent personnel from the implementing organization, to provide this function in lieu of a NASA Center GPMC. The latter programmatic part will consider the results of the technical design assessment (e.g., the PDR) while also addressing cost, schedule, risk and risk management. The two components need not be done as separate reviews (e.g., they could both be considered integral parts of the project PDR).

A team independent of the implementing organization may be chartered by OSS to lead, in parallel to the PDR activities, an independent Confirmation Assessment (CA). The chair of this team, or his/her designee, will work with the Project Manager to enable the conduct of this assessment with minimal impact to the project flow, typically by the CA team's attendance and interaction with project staff during the review(s) established by the project as described above. Both the PDR review board and the CA team will evaluate the project's readiness for implementation, and each will subsequently present their findings to the GPMC.

The GPMC chair decides whether to recommend that the project proceed to implementation. If so, the GPMC chair issues a letter with this recommendation to the Director of the implementing organization to allow its transmittal to the AA for Space Science with the Director's endorsement.

The Confirmation Review meeting will subsequently be held at NASA Headquarters where the AA for Space Science will decide whether to authorize the project to transition to implementation.

The responsibilities for the confirmation review process are defined in the table below.

Review	Responsibility
Confirmation Assessment	Independent Review Board
Confirmation Readiness Review	Implementing Organization or NMO Standing Review Board
Confirmation Review and Authority to Proceed	AA for Space Science

Each mission is reviewed for flight readiness about 6 weeks before launch. The Implementing Organization, NASA Center PMC, or JPL PMC holds the Mission Readiness Review (MRR). Based on the results of that review, the mission is certified for flight readiness by the PI and the Implementing Organization Director to the AA for Space Science. For a NASA or JPL-managed mission, certification of flight readiness will be through that Center's GPMC with the Discovery Program Manager as an ad hoc member of that board. For non-NASA missions, NMO may establish a standing review board, including independent personnel from the implementing organization, to provide this function in lieu of a NASA Center GPMC. Based on the results of that review, the PI and the Implementing

Organization Director will provide a letter certifying the mission for flight readiness to the AA for Space Science, through the Discovery Program Office.

Review	Responsibility
Mission Readiness Review/Certification of Flight Readiness	AA for Space Science

8.0 Relationships to Other Programs and Agreements

8.1 Launch Vehicles

The Discovery Program encourages a wide variety of methods for access to space. The use of ELVs, the U.S. Space Shuttle, or launch vehicles from other programs are all encouraged as ways to increase the program flexibility and maximize flight opportunities for space science. Each Discovery AO describes the launch vehicle appropriate for the mission classes included in the announcement. OSS provides launch vehicle funding (except for Space Shuttle payloads). Launch costs are part of the total cost cap for each mission. Consistent with the provision of a reliable launch vehicle for the mission, these funds may be used for other elements of the mission as delineated by the PI in the proposal and Mission Concept Study Report.

8.1.1 Expendable Launch Vehicles

The Kennedy Space Center (KSC) has been designated as the Lead Center for the acquisition and management of U.S. ELV launch services. As Lead Center, KSC will provide the interface with U.S. launch service providers. PI's may also seek alternative ELV launch services that may reduce the total mission cost. Possible alternatives include a launch provided as a non-U.S. Government contribution to the mission or launch as a secondary payload.

8.1.2 Space Shuttle

Discovery missions may be flown as Space Shuttle deployable payloads only if use of the Shuttle's unique capabilities will result in enhanced science return or are necessary for mission success. The Johnson Space Center (JSC) Space Shuttle Program is responsible for the accommodation of Space Shuttle payloads. A Discovery mission selected to be launched by the Space Shuttle requires that a Request for Space Shuttle Flight Assignment Form (NASA Form 1628) be submitted to OSS for approval and entry into the flight assignment process. The Implementing Organization defines the payload requirements and JSC defines and directs the mission requirements. JSC is responsible for execution of the Space Shuttle mission.

8.1.3 Other Spacecraft

Discovery missions may fly as investigations or secondary payloads on spacecraft flown under other programs by NASA, other U.S. Government organizations, commercial

organizations, or foreign organizations. In particular, Discovery MOs may include the contribution of a mission component to a non-U.S. Government space mission. Discovery Program interfaces with any of these organizations for the selection and agreement phase is through NASA Headquarters. For the implementation phase, the interface may be delegated to the Discovery Program Office.

8.2 Space Operations Management Office (SOMO)

JSC has been designated as the Lead Center for Space Operations and has established the SOMO, which oversees and manages much of NASA's institutional resources for space operations and communications. This includes the Ground, Space, and Deep Space Networks. In addition SOMO manages certain mission operations and network control functions, data processing and planning systems, and telecommunications systems. The requirements and interfaces between the Discovery Program and SOMO are defined on a mission-by-mission basis and are codified in a mission's Project Service Level Agreement (PSLA). PIs are to prepare and submit their PSLAs to SOMO through the Discovery Program Office prior to the Confirmation Review.

PIs are free to use all, some, or none of the SOMO-provided services. Regardless of this choice, the PI must be able to provide the rationale for the level of communications services proposed, the basis for costs of communications services, and a rationale and cost basis for mission operations services. As a matter of policy, PIs should be prepared during the mission's study phase to support tradeoff studies with OSS and SOMO on the use of NASA-provided services versus proposed alternatives.

Currently, certain SOMO-provided services, such as DSN tracking, are provided through the Space Communications budget of the Office of Space Flight (Code M). Under full cost accounting, this budget is to be allocated to the Science Enterprises which in turn will allocate to their flight missions. It is important to note that all Discovery missions selected under AO 98-OSS-04 and later AOs are to include these costs in their cost caps.

8.3 Space Science Support Office (SSSO)

This LaRC office provides support to the Discovery Program Scientist for the AO process, including the preparation and release of the AO and the technical and cost evaluation of proposals. OSS accomplishes science evaluation and final selection.

9.0 Acquisition Strategy

9.1 Announcement of Opportunity (AO) Process

Scientific investigations (missions) shall be procured through the AO process. A single PI must lead Discovery mission investigation teams. The PI may be from any category of U.S. organizations, including educational institutions, industry or nonprofit institutions, a NASA Field Center, JPL, other FFRDCs, or other U.S. Government agencies. The PI team may be

formed from any combination of these institutions. The AO selection provides the full authority necessary to contract with all members of that team without further competition for that project.

9.2 Project Implementation

The Discovery Program Office is delegated NASA's fiduciary responsibility to ensure that Discovery missions are achieved in compliance with committed cost, schedule, performance, reliability, and safety requirements. The level of Discovery Program Office involvement in this role will vary from project to project depending on the implementing organization and other programmatic considerations. The Discovery Program Office will work with the PI and the implementing organization to define roles and responsibilities to fulfill NASA's fiduciary responsibility in the most effective manner. Once an investigation has been selected for flight, failure to maintain reasonable progress on an agreed-upon schedule and/or cost performance will result in a review to consider termination.

10.0 Commercialization Opportunities

There are commercialization opportunities that may be exploited by organizations developing new instrumentation technology for Discovery missions, due to their state-of-the-art nature. Discovery investigators are encouraged to commercialize any new technology items associated with their missions. A technology infusion/technology transfer plan is a mandatory element of every Discovery Project.

11.0 Data Management

Discovery investigation teams will be responsible for initial analysis of the data, their subsequent delivery to an appropriate data repository, the publication of scientific findings, and the communication of the results to the public.

In accordance with NASA policy, data are to be released as soon as possible after a brief validation period appropriate for the mission. There is no proprietary period for exclusive use of the data for scientific analysis by the PI's or the science teams. Each Discovery Project shall prepare a Science Data Management Plan for approval by the Project Scientist and the specific NASA Program Scientist assigned to that project.

Discovery PI teams will be responsible for collecting the scientific, engineering, and ancillary information necessary to validate and calibrate the scientific data prior to depositing it in the appropriate data repository. The time required to complete this process must be specified in the proposal and should be the minimum necessary to provide appropriate data to the scientific community and the general public.

12.0 Risk Management

Since they are independent and each is unique, each Discovery Project may manage risk differently. Each will have a risk management plan documented in its project plan (or equivalent). The primary risk management tools for Discovery Projects are schedule and financial reserves as well as descoping of mission requirements above the minimum science requirements.

13.0 Logistics, Test and Verification

Logistics and test and verification are mission-unique and are addressed in the project plan or equivalent document for each project.

14.0 Reviews

14.1 Program Reviews

Because the Discovery Program is an existing level-of-effort program with independent projects, the periodic management reporting and annual budgetary process provide adequate program evaluation. Therefore, no program NAR is necessary for the Discovery Program. An IAR will be conducted for the Program.

14.2 Project Reviews

The review and reporting requirements will vary from project to project depending on the class of mission and other programmatic considerations. The following are examples of the types of reviews that may be implemented for a given project:

- Preliminary Design Review (PDR)
- Confirmation Assessment (CA)
- Confirmation Readiness Review (CRR)*
- Confirmation Review (CR) *
- Critical Design Review (CDR)
- Mission Readiness Review (MRR)*
- Flight Readiness Review (FRR)*
- Launch Readiness Review (LRR)*

*The minimum set of NASA held reviews for each mission. All other reviews may be project defined and implemented with the concurrence of the Discovery Program Manager. The Discovery Program Office will participate in major project reviews.

14.3 Project Reporting Requirements

Each Discovery Project is required to report to the Discovery Program Manager in the following forums:

Forum	Report	Schedule
Quarterly Project Reviews	Technical Progress, Cost, Schedule	Quarterly
Monthly Project Status Reviews	Technical Progress, Cost, Schedule	Monthly
Weekly Status Reports	Electronic Weekly Progress Report (Post CDR)	Weekly

15.0 Tailoring

The requirements of NASA Policy Directive 7120.4 and NASA Procedures and Guidelines 7120.5 may be tailored to effect frequent, low-cost, focused planetary science missions that will perform high-quality scientific investigations. The Discovery Program has adopted a streamlined program management structure, with NASA oversight and reporting requirements limited to that which are essential to assure agreed upon science return in compliance with committed cost, schedule, and performance requirements. Investigator teams will be allowed to use their own processes, procedures, and methods to the fullest extent practical, and are encouraged to develop and implement new ways of doing business when cost, schedule, and technical improvements can be achieved. The intention is to reduce total mission life cycle costs and improve performance. This may be accomplished through the use of new technology, strict control of costs, control of requirements changes, and more efficient management by assigning increased responsibility to the PI's.

The Discovery Program will select projects as detailed in Section 9, Acquisition Strategy, above. Each project of the Discovery Program, chosen from a competitive Phase A downselect, will be subject to a Confirmation Review with the AA for Space Science for approval to enter implementation (Phase C). This Confirmation Review takes the place of the Non-Advocate Review referenced in NPG 7120.5. Additional project-specific tailoring will be documented in the relevant mission-specific Program Level Requirements Appendix to the Discovery Program Plan.

16.0 Acronym List

AA	Associate Administrator
APA	Allowance for Programmatic Adjustment
AO	Announcement of Opportunity
CA	Confirmation Assessment
CDR	Critical Design Review

CONTOUR	Comet Nucleus Tour Mission
CR	Confirmation Review
CRR	Confirmation Readiness Review
CSOC	Consolidated Space Operations Contract
CSR	Concept Study Report
DES	Design
DEV	Development
ELV	Expendable Launch Vehicle
EM	Extended Mission
ENC	Encounter
EOM	End of Mission
FAR	Federal Acquisition Regulations
FFRDC	Federally-Funded Research and Development Center
FRR	Flight Readiness Review
FY	Fiscal Year
GPMC	Governing Program Management Council
GSFC	Goddard Space Flight Center
IAR	Independent Annual Review
ISO	International Standards Organization
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
K	Thousands (of dollars)
KSC	Kennedy Space Center
L	Launch
LaRC	Langley Research Center
LRR	Launch Readiness Review
MDRA	Mission Definition and Requirements Document
MESSENGER	Mercury: Surface, Space Environment, Geochemistry, an Ranging Mission
MO	Mission of Opportunity
MRR	Mission Readiness Review
NAR	Non-Advocate Review
NASA	National Aeronautics and Space Administration
NEAR	Near Earth Asteroid Rendezvous Mission
NMO	NASA Management Office
NPG	NASA Procedures and Guidelines
NRA	NASA Research Announcements
OPS	Operations
OSS	Office of Space Science
OSF	Office of Space Flight
PCA	Program Commitment Agreement
PDR	Preliminary Design Review
PI	Principal Investigator
PMC	Program Management Council
POP	Program Operating Plan
PSLA	Project Service Level Agreement

QPSR	Quarterly Program Status Review
RTG	Radioisotope Thermoelectric Generator
SOMO	Space Operations Management Office
SR	Sample Return
SSSO	Space Science Support Office